(7) The silent discharge is a variety of spark discharge in which the physiological activity becomes somewhat diminished, but by which, however, many undesirable accompaniments of the directly-applied sparks, for example, pain, are avoided. Although the extent of its field of action is greater than that of the actual spark discharge, its mode of action is qualitatively the same. (8) According to these experiments no physiological import can be attributed even to Röntgen rays as regards their influence upon bacterial life. (9) Neither Becquerel rays nor phosphorescent rays manifest physiological activity upon bacterial growths or upon normal skin. (10) The pathological changes produced in the skin by direct spark discharges consist of hemorrhages into the cutis, in inflammation and in the formation of vacuoles in the internal and middle coats of the arteries.

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WEITERE BEITRÄGE ZUR PATHOLOGIE UND PATHOLOGISCHEN ANATOMIE DES UNTEREN RÜCKENMARKSABSCHNITTES (Further Contributions to the Pathology and Pathological Anatomy of the Lower Portion of the Spinal Cord). L. R. Müller (Deutsche Zeitschrift für Nervenheilkunde, 1901, xix, 5 and 6, s. 303).

AND

ZUR PATHOLOGIE DER TRAUMATISCHEN AFFECTIONEN DES UNTEREN RÜCKENMARKSABSCHNITTES. DAS GEBIET DES EPICONUS (On the Pathology of Traumatic Affections of the Lower Part of the Spinal Cord. The Region of the Epiconus). L. Minor (Deutsche Zeitschrift für Nervenheilkunde, 1901, xix, 5 and 6, s. 331).

In these two articles, the authors—the former of whom has previously made an important contribution to the subject—give the histories of cases of injury to the lower portion of the spinal cord and cauda equina and discuss the diagnostic points involved. By far the most interesting is Müller's first case, since it presents the picture of a pure conus lesion, confirmed by autopsy.

A man of thirty-seven, in 1887, fell from a height of ten meters, striking his back in the lumbar region on a beam. He lost consciousness and upon regaining it suffered scarcely any pain, but was completely paralyzed. At the start he was catheterized, but later the urine passed involuntarily and without sensation. After about six weeks he began to recover the use of his arms, eventually regained some power in the legs, and could walk with a crutch. Entire incontinence of urine and feces remained, but sexual power was retained and after the accident he begat two children. Examined by the author in 1896, he presented a prominence of the spine of the first lumbar vertebra, weakness in the abductors and external rotators of the thigh and flexors of the leg, complete paralysis of the glutei, and all the muscles of legs and feet. The calf muscles, however, showed no wasting, but were thick and felt firm. There was anesthesia as high as the knees in front and extending up an area on the back of the thigh and over the buttocks. It was complete except over a narrow area on the inside of leg where touch sense was preserved. There was also loss of temperature and pain sense over penis and scrotum. Electrical irritability was lost in the gluteal and calf muscles. The patient gradually failed in health and died of pulmonary tuberculosis in April, 1900.

The autopsy showed an old fracture of the first lumbar vertebra, with compression and entire destruction of the cord from the fourth lumbar throughout the sacral segments, the lower part of the conus having escaped. The nerve roots forming the cauda equina were little affected. Microscopical examination showed in the cervical and dorsal regions, a small area of degeneration in the columns of Goll, a slight triangular area of degeneration in the antero-lateral tract, and dilatation of the central canal. In the upper lumbar region degeneration involved all of the columns of Goll, while the fibers of Burdach's column were extraordinarily thick and deeply stained. In the second lumbar segment the deformity began, and in the third, the entire posterior part of the cord was destroyed, but the roots were recognizable though pushed to one side, and were well medullated.

In the fourth and fifth lumbar segments the cord structure was unrecognizable, its usual place being filled with glia tissue. Lateral from this, however, were numerous well-preserved nerve bundles, and in the middle of it, a bundle of well-medullated fibers, which were continued above in Burdach's column, and from the way they stained, etc., appeared to be newly formed. In the sacral segments similar conditions existed, the posterior roots contained fewer medullated fibers than the nerves of the cauda. The bundle of medullated fibers was still visible in the mass of glia tissue. On the lowest segments, the outline of conus was again visible, and there were even some cells at the base of the anterior horn which appeared to be ganglion cells. The cross section in fact appeared normal. The remaining roots forming the cauda, contained mainly well-medullated fibers, only a few of them showing degeneration. In the nerves passing to the paralyzed muscles there was some rarefaction of fibers, but little degeneration. There was, however, such a marked interstitial deposit of fat that the cross section of the nerve was far greater than normal. In the affected leg muscles the muscular tissue was largely replaced by fat. The author analyzes this case, and tells why he long before had diagnosed conus lesion. Most of the symptoms might be produced by lesion of the cauda equina below the fourth lumbar root. The patellar reflex was lost, however, while the quadriceps continued to functionate well; also the sensory fibers from knee and thigh were intact. This was explained as due to breaking of the reflex arc, by a centrally-located lesion, which would also account for the dissociation of sensation found in an area on the legs. The complete paralyses of trunk, arms and head which existed for several weeks, was explained by assuming that there was a hemorrhage filling the central canal, which was later absorbed, and since the autopsy showed that a dilatation had existed, even though he found no trace of blood pigment, the author thinks that his explanation was probably correct. That the lowest portion of the cord (the two coccygeal segments) was preserved may explain the astonishing fact, that though there was incontinence of urine and feces, erection and procreation were still possible, and we should locate the erection center in these segments. It is necessary, however, to assume a connection of these segments with the brain, and this he thinks was effected through the small bundle of newly-formed fibers found passing through the replacing neuroglia mass, and eventually reaching the columns of Burdach. This was also evidenced by the fact that in penis and scrotum touch sense was preserved.

Müller gives the clinical histories of two more cases, and from the study of these three and their comparison with other observations, he feels justified in drawing the following conclusions: The first lumbar vertebra is the one most frequently fractured in injuries to the lower portion of the spinal column. The preservation of the anal reflex shows that the lowest part of the cord has escaped injury. If the sexual function is retained, not only must the lower half of the conus be preserved, but it must remain connected with the cord above, and the brain.

Minor calls particular attention to the fact that between the second and third sacral segments there occurs a marked change in the microscopic picture. This was first described by Müller. The anterior group of motor cells here disappears and a new group of multipolar cells appears in the region between anterior and posterior horn. The posterior commissure disappears and there is found instead in the medioventral part of the posterior column a sharply-defined bundle of longitudinal fibers which passes into the gray matter and proceeds directly to the region of the intermediate cell group just mentioned.

Further, the pyramidal tracts extend only to the third sacral segment, descending degeneration always disappearing at this point. The region from the third sacral segment caudally forms a special part of the spinal cord which has been called the conus, and lesions confined to this region give a typical clinical picture. In lesions of the region immediately above the third sacral, however, the clinical picture is much more complicated, and it has been thought by some authors impossible to construct one which is typical. This, Minor thinks, is only true for complete transverse lesions, in which case symptoms from the adjoining lower segments are also produced. When a central lesion of the gray matter or of the corresponding roots from the region in question occurs alone, or when the two are combined, the symptoms produced are typical. These Minor gives as two negative and several positive. The negative symptoms are integrity of the sphincters and preserved knee-jerk. The positive symptoms are paralysis in the region of the sacral plexus, in every case the peroneal nerve being most severely and permanently affected. For this region (the fifth lumbar and two upper sacral segments) he proposes the name "Epiconus." As illustrating his views he gives the clinical histories of six cases, in none of which was there an autopsy, however. He also analyzes several cases from other sources. The two articles give an excellent résumé of the subject, but space permits of no more than the outline of them here presented. ALLEN.

DIAGNOSTIC DIFFERENTIEL DE L'HÉMIPLEGIE ORGANIQUE ET DE L'HÉMIPLEGIE HYSTERIQUE (The Differential Diagnosis of Functional from Organic Hemiplegia). Babinski (Gazz. des. Hôp., Vol. 73, May 5 and 8, 1900, p. 521 *et seq.*).

The author points out that in organic hemiplegia the paralysis is limited to one side of the body, while in hysterical hemiplegia it is not. This observation applies particularly to the face, the paralysis of which in the hysterical form is generally bilateral. In the organic form the paralysis is not systematic. If, for example, one side of the face is profoundly paralyzed, the weakness remains quite evident during the bilaterally-associated movement of the face, but in the functional the paralysis is usually systematic. For while the unilateral movements of the face may be completely abolished, the facial muscles on the paralyzed side act well during the bilateral movements. In the organic there is muscular hypotonicity, principally at the beginning, which is shown in the upper limb by the exaggerated flexion of the forearm. In the functional form there is no hypotonicity; when there is, for example, facial asymmetry, it is due to spasm of the one side. The periosteal and